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INHERITANCE OF FERTILITY IN SHEEP.

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THE inheritance of fertility in mammals is difficult of investigation because of the large number of environmental influences which may limit the full expression of the inborn ability of the animal with reference to gamete production. Sheep are particularly difficult animals to study in this particular, because of their extreme sensitiveness to changes in climate and food supply. Evvard has shown that ewes gaining lightly at time of mating produced only 1.44 lambs; ewes gaining a medium amount, produced 1.59 lambs; while ewes gaining rapidly produced 1.8 lambs. Hence if the basis of selection for high fertility be numbered of offspring at a birth, it is possible to make rather serious mistakes due to the failure of the number actually produced by a ewe to correspond closely with the inborn fecundity of the animal.

The figures quoted in the following paragraphs are derived from a study of 3,715 Southdown births recorded in pedigrees started from single births, and 5,313 matings recorded in pedigrees started from twin births. Table I shows the results for the first group and Table II the result for the second group.

TABLE I.—*Pedigrees started from single births.*

RELATIVE INFLUENCE OF SIRE AND DAM ON BIRTH NUMBER.

No. cases.	Sire.	Dam.	Average No. Progeny.	No. cases.	Sire.	Dam.	No. progeny.
1,872	1	1	1.29	1,872	1	1	1.29
925	1	2	1.28	570	2	1	1.25
14	1	3	1.43	12	3	1	1.50
570	2	1	1.25	925	1	2	1.28
306	2	2	1.24	306	2	2	1.34
10	2	3	1.20	6	3	2	1.17
12	3	1	1.15	14	1	3	1.43
6	3	2	1.17	10	2	3	1.20

TABLE II.—*Pedigree started from twin births.*

RELATIVE INFLUENCE OF SIRE AND DAM ON BIRTH NUMBER.

No. cases.	Sire.	Dam.	No. progeny.	No. cases.	Sire.	Dam.	No. progeny.
2,805	1	1	1.51	2,805	1	1	1.51
1,294	1	2	1.55	687	2	1	1.57
21	1	3	1.86	19	2	1	1.68
687	2	1	1.57	1,294	1	2	1.55
468	2	2	1.56	468	2	2	1.56
10	2	3	1.69	7	3	2	1.43
19	3	1	1.68	21	1	3	1.86
7	3	2	1.43	10	2	3	1.60

But one conclusion seems possible from the above—that there is no difference in breeding quality between twins and singles, and that consequently their genetic constitution must be nearly alike. Further evidence on the same point is found from a study of the mean breeding qualities of twins and singles. Combining the two sets of statistics, *having due regard to the frequency in which twins and singles ordinarily occur,* the mean breeding records for ewes are as follows:

Ratio cases.	Birth rank of dams.	Average number lambs at birth.
17,958	1	1.3274 ± 0.00234
9,052	2	1.3444 ± 0.00345

The difference between them is 0.0170 ± 0.00422—a difference nearly large enough to be statistically significant if the actual numbers given under the ratio existed. If the actual cases arising from each type of pedigree are considered, however, the differences are not significant.

Evidences of Mendelian inheritance are difficult to obtain owing to the impossibility of determining the genetic type of the grandparents, but such as exist are presented nevertheless.

If there is a true segregation of fecundity factors a comparison of the maternal grandparents with the birth rank of the progeny should give some idea of the factors being transmitted. It is inconceivable that the sire mated to a ewe should influence the number at a birth; but in order to test such an effect, statistical studies were made which showed that the birth rank of the sire had no effect on the immediate progeny. When both grandparents were single the average lambing was 2.07; when one was a single and the other a twin, the average was 2.11; and when both grandparents were twins, the average was 2.05. None of these differences are statistically significant, hence one could again conclude that twins and singles are not genetically different. However, when one of the grandparents was a triplet, the average was 2.43, which would suggest that in order to produce triplets, factors not present in twin or single producers must be present. The chance that the difference in favor of the triplet grandparents is significant is only two and a half to one, due to the small numbers from which triplet grandparents could be discovered. However, the uniformity with which this result holds, no matter how varied the source of the figures, gives the writer confidence in the conclusion that there is no genetic difference between twins and singles, but that triplets in sheep differ from either.